METHOD, GATEWAY SYSTEM AND ARRANGEMENT IN A COMMUNICATION NETWORK

FIELD OF INVENTION

The present invention relates to a gateway system, a method and an arrangement in a digital conversational multimedia communication system in Internet Protocol (IP) environments. More specifically it relates to networked application infrastructure services.

DESCRIPTION OF RELATED ART

In existing communication models, the network centric approach is the dominant one. The network centric approach traditionally implies that services are provided by the network in a monolithic fashion, and the one who owns the network owns the services. The implication is that the terminal and the end system are restricted to use the services offered basically by one or a few operators, and as such mainly on subscription basis. The system service is typically a bundling of a set of supporting network services, you get everything or nothing. The bundling is typically done in the switching systems e.g. local exchanges, Mobile Switching Centre (MSC), etc. There is no or little freedom to choose the best available service provider for these supporting network services on a call by call or session by session basis. For example, a subscriber to a telephony service is more or less restricted of his phone service provider to use any gatewaying services to other networks, transcoder services, bridging services for conferences etc.

A Gateway is a network node in a communications network, equipped for interfacing with another network that uses different protocols. The gateways mentioned here interconnect higher layers than the link and network (IP) layer. It usually supports address mapping and may also provide transformation of the data between the networks to support end to end application connectivity.

In a deregulated market, a multitude of service providers of all sorts of services, not only the "obvious ones" are expected to be available on the market. This requires that the monolithic services of today are broken apart into their constituent parts and then made available as separate services.

There are ways to control media gateways today, but these mechanisms rely on a master-slave relationship, i.e. he who wishes to make use of the media gateways must also be the actual owner of the resources. Ownership is defined as a configuration issue, and is not done on a call to call basis. One such mechanism is the megaco protocol, draft-retf-megaco-protocol-07.txt, the Internet Engineering Task Force (IETF)/H.248 of International Telecommunication Union - Telecommunication Standardization Sector (ITU-T).

Examples of such network-supported services are:

- Transcoder services, for e.g. speech, audio, and video.
- Conference units and audio/video media mixers.
- Security proxies e.g. trusted security proxies for encryption and decryption.
- Other application layer gateway services.

Note that the service processes a media stream that is not necessarily finite in time or size, but it really applies to a stream. Compare the difference to sending a file to a server to perform a file conversion. Also real-time characteristics are generally required by the media processing function. A typical characteristic of a stream is that the receiver starts viewing or listening to it before the sender has ceased to transmit.

Therefore, what is further needed is a way of making these services unbundled so that they may be accessible by anybody as well as provided by anybody as separate services.

SUMMARY OF THE INVENTION

The present invention relates to multimedia communication between end systems in IP environments.

More particularly it relates to that all services concerning processing of media streams are bundled. When you get a subscription from one service provider, you are more or less forced to use the services of that provider. The service in question typically only provides services to subscribers of that service provider.

Accordingly, it is an object of the present invention to unravel the above-mentioned problem.

Particularly it is an object to unbundle the services to be considered as separate services and to unbundle these services from the end-user application services.

The solution, according to the invention is a communications system in which the service is publicly available by any end system via a published Uniform Resource Identifier (URI).

A method for controlling processing of streaming media used in inter-personal communication services, sent from a second end system over an IP network, via a gateway system, over the IP network to a first end system by means of the gateway system providing a service of streaming media processing said service being independent of the end user application control, the gateway system comprising a gateway controller having a Uniform Resource Identifier (URI) which is known to any potential service user, such that the gateway system is available for external control by any potential service user, through the gateway controller, according to a first aspect of the invention, includes the steps of:

the second end system addressing the gateway controller in a first path, for the purpose of controlling the service by configuration and activation, by means of the known URI;

processing the streaming media in a second path that is separate from the first path, in such a way that the data is processed and forwarded to the first end system continuously without having received the complete media stream before starting the processing.

A method according to this first aspect of the invention is hereby characterised by what are the features of claim 1.

According to a second aspect, the invention can be implemented by software code segments and e.g. be stored in any of the relevant entities of a communication system, such as an end system or terminal, a gateway controller, a gateway etc. The computer program product is directly loadable into the internal memory of a digital computer within said entities and includes the software code portions for performing the steps of the method according to the invention, when said program is run on a computer. A computer program product according to this second aspect of the invention is hereby characterised by what are the features of claim 10.

According to a third aspect of the invention the computer program product is stored on a computer usable medium, comprising readable program for causing a computer, within an entity in the communications system according the invention, to control an execution of the steps of the method according to the invention. A computer program product according to this third aspect of the invention is hereby characterised by what are the features of claim 11.

A communications system for processing streaming media used in inter-personal communication services, according to a fourth aspect of the invention includes a first entity, a second entity and a service providing gateway system all being connected to an IP network within the communications system, **characterised** in that:

the gateway system is adapted to provide a service of streaming media processing, said service being independent of the end user application control, the first entity, the second entity and the gateway system,

the gateway system has means for processing a streaming media, sent from the first entity via the IP network to the second entity, in such a way that the data is processed and forwarded to the first end system continuously without having received the complete media stream before starting the processing

the gateway system comprises a gateway controller adapted to control the service by configuration and activation, said controller having a Uniform Resource Identifier (URI) which is known to any potential service user, including the first entity, such that the gateway system is available for control by any potential service user, through the gateway controller.

A communications system according to this fourth aspect of the invention is hereby characterised by what are the features of claim 12.

A gateway system according to a fifth aspect of the invention is connected to an IP network. The gateway system offers a service of processing a media stream sent between end systems connected to the IP network. The gateway system includes a gateway that has means for processing the media stream sent from a first end system via the IP network to a second end system. The gateway system further includes a gateway controller that manages the gateway. The gateway controller has a URI. The gateway system is made known to any potential service user, via a Uniform Resource Identifier (URI) of the gateway controller. The gateway system has means for being configured by any end system.

A communications system according to this fifth aspect of the invention is hereby characterised by what are the features of claim 19.

An advantage of the present invention is freedom of choice for all types of services. Examples of services supported by the gateway and gateway controller system using the present invention are audio and video transcoding, transmedia coding (e.g. text to speech), audio or video mixing devices, and trusted security services such as anonymizers.

Another advantage of the present invention is that a full end-system choice of service is possible without being a subscriber to a particular service provider.

Another advantage of the invention is that it makes it possible for any end system to access the service.

Another advantage of the invention is that the service can be made independent of the end-user application in which it is used. For example, a video transcoding service may equally well be used in a video telephony application, or in a video streaming ("web-TV") application. This means a high degree of service reusability as well as a removing the need to develop that service specifically as part of a particular application.

Another advantage of the present invention is that more services become available to choose between and the probability to find a suitable service for a specific call or session is increased. The end-user can also choose a service that costs as much as he is willing to pay.

Yet another advantage is that service providers may select the best of service systems from suppliers that suit their individual needs. They are hence not limited to monolithic or bundled systems from a few suppliers.

Further scope of applicability of the present invention will become apparent from the detailed description given hereinafter. However, it should be understood that the detailed description and specific examples, while indicating preferred embodiments of the invention, are given by way of illustration only, since various changes and modifications within the spirit and scope of the invention will become apparent to those skilled in the art from this detailed description.

BRIEF DESCRIPTION OF THE DRAWINGS

Figure 1 shows a schematic block diagram of the communications system according to the invention.

Figure 2 shows a schematic block diagram of a gateway system according to the invention.

Figure 3 shows a flowchart of the method according to the invention.

Figure 4 shows a schematic block diagram of a scenario according to the present invention.

DESCRIPTION OF PREFERRED EMBODIMENTS

The invention relates to conversational multimedia communications including a media stream. The media stream here is defined as a stream of information that is continuously transferred and is not necessarily finite in time or size. A stream is characterised by that the receiver is processing and interpreting the information before the sender has ceased sending it. Example of a media stream is real time information, voice, music, video conference, etc. Example of not being a media stream is sending a file to a server for conversion, down loading of a video film from a server on Internet and after the download look at the film, etc.

Figure 1 shows a communications system 101 according to the invention. The communications system 101 includes a first entity A and a second entity B, the first entity A being a mobile terminal and the second entity being an end system or end user serving terminals. Both entities being involved in the same session. The first entity A and the second entity B have both a respectively digital computer, each computer having an internal memory for storing a computer program, not shown in the figure. The session in this fictitious example has two media components, C1 and C2, e.g. voice and video that are to be transferred from the second entity B, over an IP network 102 to the first entity A, within the communications system 101. In the session establishment 103, the first entity A and the second entity B have negotiated specific formats for the voice and video streams, e.g. Global System for Mobile communication (GSM) voice and Motion Pictures Expert Group 2 (MPEG2) video. In this example the second entity B can

only support MPEG2 video C1, whereas the first entity A is a mobile terminal that has a small screen and can only handle H.261 video. H.261 is a video codec standard protocol for audio-visual services at rates of px64kbit/s. Nevertheless the first entity A has agreed to letting the second entity B transmit the video in the MPEG2 format. To handle this, a transcoding service is required that transcodes MPEG2 to H.261 video. The voice stream C2 which is typically bi-directional is in this example left unmodified end to end between the second entity B and the first entity A that is depicted in Figure 1. The A to B session invitation and negotiation 103 may for example be done using standard Session Initiation Protocol/Session Description Protocol (SIP/SDP) procedures. SIP is an application layer protocol for creating, modifying and terminating sessions with one or more participants. These sessions include Internet multimedia conferences, Internet telephony calls and multimedia distribution. SDP is a protocol intended for describing multimedia sessions for the purpose of session announcements, session invitation, negotiation and other forms of multimedia session control. The communications system 101 also includes a gateway system S providing a service of streaming media processing. This service is independent of the end user application control. In this example the service is transcoding of MPEG2 to H.261 video.

The gateway system S will now be described in more detail supported by the block diagram showed in **Figure 2.** The gateway system, which is referred to as 201 in figure 2, comprises a gateway controller 202 and a gateway 203. These two entities can be co-located in the same node or be two separate nodes, each separately connected to the IP network. They are both connected to the IP network (see 102 in Figure 1) and each typically has an IP address. The gateway system 201 is available for external control through the gateway controller 202. The gateway controller 202 is publicly available via its published Universe Resource Identifier (URI) e.g. service@domain. The URI can e.g. be published on a homepage on the Internet. The gateway has means 204 for processing the media stream C1, i.e. in this example transcode MPEG2 C1 to H.261 C1' video. The invocation 104 takes place on a path between the gateway system S and the first entity A that is separate from the path used for the media stream C1' between the gateway system S and

the first entity A, thus unbundling the actual service control from the media stream completely. The gateway controller 202 manages the gateway 203. The communication 205 between the gateway controller 202 and the gateway 203 may e.g. be according to IETF megacop/ITU-T H.248. (megacop = Media Gateway Control Protocol = H.248). The gateway 203 and the gateway controller 202 each has a digital computer having an internal memory for storing a computer program 207.

The first entity A separately, i.e. outside the A to B session 103, invokes 104 a separate transcoding service by the gateway system S that transcodes MPEG2 to H.261 video. This is shown in **Figure 1**.

This example will show a unidirectional flow, but a bi-directional flow is also possible.

The first step is to configure the service. That is done with one or more service requests sent in a control protocol 206 from the first entity A to the gateway controller 202. The control protocol may be based on SIP or SDP. It is also possible to send the service request in the same message exchange as the A to B session invitation. The gateway controller 202 is addressed using a URI in the form service@host e.g. transcoder@services.oprator.com in the request. In the case a control protocol 206 being based on SIP and SDP, the URI would be used in the SIP Uniform Resource Locator (URL) according to known practice in the format sip:service@host. The service request typically contains information about type of service, e.g. transcoding from MPEG2 to H.261. The service request(s) also contains information about the address to which the stream should be sent, e.g. IP address and port number of first entity A and other necessary address information pertaining to the entities A and B and the associated media stream.

One or more responses 206 to the service request(s) including the necessary address information, pertaining to the gateway system S and gateway 203, of relevance to the associated media stream may be exchanged. This includes the

address information about the inlet to the gateway 203 in the form of an IP address and a port number.
At this stage the service is configured. The response(s) typically also indicate the result of the configuration requests, such as success or failure.

The next step is the actual activation of the service. This is indicated by the service activation request of 206.

It is fully possible that the service configuration and service activation may be bundled in one and the same request. It is also fully possible that configuration is done in parts using steps of several requests and responses.

The second entity B starts transmitting the media stream C1. The video stream C1, in MPEG2 format, is transferred over the IP network 102, through the assigned port of the gateway 203 and is processed by the means for processing i.e. the transcoder from MPEG2 to H.261 video. The media stream C1' in H.261 video format is then transferred, over the IP network 102, to the assigned port of the first entity A. The voice stream C2 is transferred unmodified over the IP network between the entities.

Figure 3 shows a flowchart of a possible scenario of processing a media stream transferred from a first end system via a gateway system to a second end system within a communications system.

The method includes the following steps:

301. An end system shall make a call to another end system. For this specific call the end system wishes to use a service provided by the gateway system for processing a media stream to be transferred. The gateway controller is addressed by the end system in a first path by means of the known URI This is for the purpose of controlling the service by configuration 302 and activation 303.

304. Then the transmitting side sends its media stream, which is processed in the gateway system on the way to the receiving side. streaming media is processed in a second path that is separate from the first path, in such a way that the data is processed and forwarded to the other end system continuously without having received the complete media stream before starting the processing.

The method is implemented by means of a computer program product comprising the software code portions for performing the steps of the method. The computer program product is run on a computer stored in a digital computer within the end system and in the gateway system.

The computer program is loaded directly or from a computer usable medium, such as floppy-disc, CD, Internet etc.

The method above can also be performed in another possible scenario shown in **Figure 4**. In this scenario, the end system A requires to process a media stream C. A sends the media stream C over the Internet 401 to a gateway system S in which the media stream is processed and forwarded to A.

An example of this is if the end system A may be listening to a radio broadcast that it wishes to record parts of. Which part to record is not known beforehand. The end system A prefers to store the recorded format of MPEG1, layer 3 (MP3) due to internal memory limitations, whereas the radio broadcast is available in 44,1 kHz Pulse Code Modulation (PCM) in stereo. The end system A then continuously sends the 44,1 kHz PCM stream C to the service system S, which in this case constitutes an MP3 compressor system. The service system S returns MP3 in streamed format C' to the end system A. A may then record selected parts in MP3 format as A listens to the radio broadcast.